GRADUATE JOURNAL

A Review of Current Graduate and Research Activities

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CONTENTS

More Notes on Russian Education . ELIZABETH S. DALLAS 99

Boston University Films 102

Graduate Schools and the Training of Teachers
DAVID F. TRASK 103

Boston University Book Reviewed . GEORGE R. HORNER 107
Races and People, by William C. Boyd and Isaac Asimov

Announcement 108

Nonparametric Statistics . . GOTTFRIED E. NOETHER 109

University Lecture — April 9, 1957 111

Tower Collection in the Chenery Library M. D. HERRICK 112

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GRADUATE JOURNAL

A Review of Current Graduate and Research Activities

VOLUME V MARCH 1957 NUMBER 7

More Notes on Russian Education

ELIZABETH S. DALLAS

This article is based on information submitted to the Boston University Graduate Journal by Vladimir Krylov, Assistant Head of the Administration of Specialized Secondary Schools under the Ministry of Higher Education of the USSR. Submission of this material was made in response to a request directed to the Soviet Information Bureau, Moscow, by the Editor of the Journal. The original material was received in the form of three articles titled: "Here One Can Study," by F. Kuznetsov, "The Moscow State Conservatoire Named after Chaikovsky," by G. Polyanovsky, and "Position of Teacher in USSR," by A. Solovyov. The positions or titles of the three authors were not identified.

The Moscow University — the first university in Russia — was founded about 1755 near Lenin Hills. In the beginning it had three faculties and an enrolment of 300 students.

There are now 22,000 students attending the twelve faculties of the University. 2,500 teachers and assistants guide their studies, including thirty academicians and fifty-nine corresponding-members of the Academy of Sciences of the USSR. Frequently, the lecturers in the fundamental courses are prominent men of science. For example, in one of the auditoriums of the faculty of chemistry, the lecturer on organic chemistry is the President of the USSR Academy of Science, A. Nesmeyanov.

Educational expenses of a student are apparently quite low. A student pays approximately 15 rubles a month for his room, and the University studies are free. The students receive a regular monthly allowance from the Government.

In specialized institutions, such as the Moscow State Conservatory, now entering its first centenary, a similar growth is apparent.

Approximately 800 students now attend the Conservatory, including about sixty musicians in the "special national section" who will enter the higher courses of the Conservatory at the close of their preliminary studies.

Composition is taught according to the traditions of Tchaikovsky and his disciple, Sergei Taniev, which produces creators of multinational Soviet music. Well-known artists such as the pianists Constantin Igumnov and Alexandre Goldenveiser, the violinist David

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Oistrach, the organist Alexandre Gedike, the orchestra conductor Alexandre Gauk, and the singers Elena Katulskaya, Nina Dorliak, and Maria Vladimirova guide the pupils in their studies.

Attached to the Conservatory are various musical school training cadres for the higher establishments of learning and a ten-year school for children who study the disciplines practised in schools of general education in addition to performance on various musical instruments. The Conservatory also contains a children's school for chorus singing and a training program for chorus conductors and vocalists. A special opera studio trains artists for the opera-theatres of the country, and every year it presents new classical productions. Two symphony orchestras, each numbering from eighty to a hundred musicians, a chorus, and some individual students systematically present concerts in the Great and Small concert halls of the Conservatory. Young composers and theoreticians of the Conservatory are united in the Union of Composers, under the auspices of the Soviet composer, Professor Dmitri Kabalevsky.

Of particular interest is the training and general status of teachers in the USSR. According to Mr. Solovyov, over 1,700,000 teachers are now employed in the Soviet schools. Teachers of elementary grades (first to fourth) must have secondary pedagogical education. Their term of training at pedagogical schools is three years. Teachers of senior grades (fifth to tenth) are trained in universities or pedagogical institutes where the term of studies is five years.

After teaching school for five years, every teacher attends one of the several advanced training institutes for teachers that have been established throughout the country. When he attends these institutes, the teacher is relieved from work in school but retains his average salary. His traveling expenses are furnished; lodgings are furnished free of charge; and his training, use of laboratories, and text-books are also free of charge. All expenses are borne by the state.

A teacher of the elementary grades works four academic hours every day teaching in the class-room (the lesson is forty-five minutes long in all grades), and a teacher of the senior grades teaches three academic hours a day.

Teachers of senior grades receive higher wages than teachers of elementary grades; the salary depends on education, the length of work in school, and the grade that he teaches. If he works more hours than has been indicated above, he receives higher wages. He also receives additional pay for checking copy-books, for guiding the class, for taking charge of special study rooms, and for guiding work on the school plot of land. The over-all teachers' salaries have been raised on two occasions in the last ten years, and they are now paid on a par with engineers and technicians.

During the summer, teachers receive a two-month paid vacation. A number of categories of workers and office employees are entitled to pensions for length of service irrespective of age, and teachers belong

to such a category. In order to be entitled to an old age pension, a teacher must work twenty-five years in school. This pension is paid to the teacher in full, even if he continues on his job.

Those teachers working in the country schools have additional privileges. They and members of their families are given cottages with plots of land free of charge. All communal services are paid for by the state. If a teacher desires to build a house of his own, the state lends him money for this purpose (to be repaid within ten years), grants him a plot of land free of charge, and helps him with building materials and transportation. City teachers are given accommodation in municipal dwelling houses.

The legal status of a teacher is protected by law. For instance, the school's principal cannot dismiss a teacher. The right to hire, transfer, or dismiss a teacher belongs only to the regional or territorial public education departments. The public education bodies do everything to enable a teacher to work for a long period of time at the same school.

An important role in the school life is played by the Pedagogical Councils of which all teachers are members. The Pedagogical Council discusses pedagogical and educational questions such as: results of school studies, questions relating to the methods of training, questions of teachers' propaganda carried out among the parents, and so forth. The members of the Council do not merely discuss school affairs but adopt decisions which are binding for the school principal, who cannot repeal them. In the case of disagreement with the Council's decision, the principal reports this to the public education department, which in turn reconciles the two.

The Presidium of the USSR Supreme Soviet awards teachers with orders and medals of the Soviet Union. For ten years of fruitful work in school, a teacher is awarded the "Labour Valour" medal; for twenty years he is awarded "The Badge of Honour" order; for twenty-five years he is awarded "The Red Banner of Labour" order; and for thirty years he is awarded the Order of Lenin, the highest order in the USSR. The title of Merited Teacher is bestowed on the most outstanding teachers. Local public education bodies reward teachers with commendations, premiums, free accommodations to sanatoria or rest homes, and free tourist tickets.

Public education departments and trade unions also provide for rest and recreation for the teacher. His accommodations to sanatoria or rest homes are provided either free of charge or at a seventy per cent discount. Teachers' clubs are organized to cater to their cultural needs.

The teachers' activities are not limited to school work. They take part in district pedagogical conferences held two or three times a year. At the conferences they discuss the teaching and educational work in the schools of the district, exchange experiences, and present their complaints against the workers of public education departments

and local Soviets. Pedagogical problems of major importance are discussed at these meetings.

Active participation by the teachers in the pedagogical readings held every year in the regions, territories, and republics is maintained. They make reports there on education and teaching problems. In recent years, pedagogical readings have devoted great attention to polytechnical training. The most outstanding reports are printed in pedagogical magazines and are issued in the form of booklets.

At this time we in the United States are greatly concerned with improving our educational facilities. We cannot ignore the challenge presented to our public and private educational institutions by the state stimulated and financed educational system of the Soviet Union. We must not only give critical examination to our concepts and aims but must take action.

Boston University Films

The following article is the second of a series of descriptive summaries of films produced in the Department of Biology and available for distribution, to be published in the *Journal*.

"Living Microscopic Blood Vessels: Normal and Pathological Conditions"

GEORGE P. FULTON and BRENTON R. LUTZ

One reel (800 feet) 16 mm. silent Kodachrome film with titles. Running time, 30 minutes at 16 frames per second. Certified by the American College of Surgeons.

The hamster cheek pouch is demonstrated as a living laboratory for gross and microscopic investigations of peripheral vascular phenomena, particularly spontaneous and artificially produced thromboembolism, blood vessel "fragility," inflammatory responses, effects of chemical and physical trauma, changes following adrenalectomy, and dynamic aspects of tumor transplants. Significant concepts are illustrated, such as extensive nature of perivascular nerve plexus, distribution of contractile perivascular elements, vasomotion, diphasic vasomotor responses to microelectrode stimulation, noncontractility of capillaries, vascular sphincter activity, Leukocytosis, mural thrombosis in infection, embolization, susceptibility of venules to thrombosis, petechial formation and permeability changes, and the role of platelet plugs in hemostasis.

The purchase price is $150.00.

"Tumor Transplantation in the Hamster Cheek Pouch"

GEORGE P. FULTON and BRENTON R. LUTZ

One reel (400 feet) 16 mm. silent Kodachrome film with titles. Running time, 15 minutes at 16 frames per second. Certified by the American College of Surgeons.

[*Continued on p. 106*]

Graduate Schools and the Training of Teachers

A Reply to Professor Armand Siegel

DAVID F. TRASK*

Professor Armand Siegel, writing in the January, 1957 issue of the GRADUATE JOURNAL, expressed his reactions to the problem of training teachers for the expected expansion facing higher education. He differs from the well-known pamphlet *The Graduate School Today and Tomorrow*, written in behalf of the Committee of Fifteen, which called for increasing attention in the graduate schools to the training of teachers. The core of Professor Siegel's objections to the report seems to be his assumption that concentration on the training of teachers may vitiate the most important functions of the graduate schools, which he lists as "... research into the fields of humane and scientific knowledge for their own sakes ... the unification of knowledge in the face of its proliferation...." He notes that, in the past, the solution to increased needs has been "professionalization." Accordingly, he recommends that "graduate normal schools" be developed to provide professional training for prospective college and university instructors. He is convinced that the graduate schools will have plenty to do without becoming more concerned with the preparation of teachers. He concludes by stating: "I hope we shall know when to let them go, before they swallow us up." Presumably he refers to teacher training programs developing in graduate schools.

It should be noted that other commentators have adopted opposing views. Professor Dexter Perkins, the President of the American Historical Society, devoted a portion of his recent Presidential Address to the same problem. His oration, entitled "We Shall Gladly Teach," discussed the responsibilities of teachers, considering the expansion which is about to occur. He considers ways and means of adjusting the graduate schools to demands the future inevitably will make on them. Indicating the significance of the report of the Committee of Fifteen, Professor Perkins called for certain changes in the preparation of graduate students which would fit them for teaching without unduly interfering with their intellectual and scholarly pursuits. Evidently, he believes that graduate schools must expand and adjust to the needs of the future, but he does not envision anything quite so drastic as "graduate normal schools."

This writer takes issue with two major assumptions which Professor Siegel appears to make. One of these is that graduate schools cannot meet the task of providing competent teachers without perverting their traditional functions. The other is that preoccupation with scholarship for its own sake, free inquiry, is inimical or unrelated in major respects to good teaching or teacher training; in other words, a deep gulf divides the scholar from the teacher.

Professor Perkins believes, in the light of the need for teachers, that effective steps can be taken to alter the character of the graduate schools somewhat without destroying their morale or inhibiting their functions. Professor Carl Schorske of Wesleyan University adopted the same point of view in an address to the Graduate History Club of Harvard University recently. Such expedients as enlarging scholarship funds, offering more

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teaching opportunities to graduate students, providing constructive criticisms of their performances, permitting more rapid progress to the Ph.D., and expanding the facilities of the graduate schools are alternatives which may well be highly practical, highly susceptible of accomplishment, if we have the courage and the imagination to adopt them. It is abundantly clear that such efforts would require tremendous effort and application, but perhaps they are not so difficult as Professor Siegel infers. Increasing the magnitude and scope of graduate education does not necessarily mean that standards must be sacrificed.

Many recent writers have concerned themselves with Quantity versus Quality in education. Professor Douglas Bush of Harvard mordantly predicts a great decline in standards unless the gates are closed to the onslaught of the "barbarism" he sees in the so-called "bulge." Professor Henry Steele Commager of Amherst College recognizes the problems the "bulge" poses, and argues for the cultivation of intellect — "Brains Not Bricks." While Professor Bush is certainly pessimistic, Professor Commager offers constructive education to all who are qualified without lowering standards. Many writers assume that increasing demands on education require qualitative improvement, and believe that such changes are possible if education rises to the challenge.

Turning to the second assumption, that teaching and research are antithetical or unrelated in some respects, the following views may suggest alternatives to those of Professor Siegel. He believes "... that the aims of mass training of college teachers and the nurturing of scholars in the spirit of free inquiry will both flourish best if carried on separately." It is indisputable that some students are particularly suited or attracted to research, while others are peculiarly suited or attracted to teaching. Their particular talents and desires must be recognized. There is, however, no necessary reason why the two species cannot coexist in the atmosphere of learning and contemplation which graduate schools seek to create. Why should special training for future teachers somehow detract from the scholarship and contemplation of either the research-minded or the teacher-minded? Undoubtedly, those who are not interested in teaching should not be required to undergo any special training for something they do not intend to undertake. On the other hand, there is no reason why such training should not be provided for those who desire to teach.

Perhaps the most significant factor overlooked by Professor Siegel is that, for the college or university instructor, teaching and research are often dependent on each other. Professor Perkins adopts the view, widely held in the profession, that: "For the college teacher, instruction and research are both fundamental. They ought not to be separated. There is no real dichotomy between them; they are two faces of the same problem. It should be clear, even to the most enthusiastic teacher, that research is, in some sense of the word, indispensable to the practice of his profession. We need to be ever-inquiring if we are to be effective teachers."

It is essential, then, that prospective teachers be initiated properly into the life of study and contemplation emphasized by graduate schools. The intellectual experience of graduate study in the traditional sense of the term is as necessary for teachers as for research specialists. The proposal that college teaching be professionalized to the extent of establishing "graduate normal schools" especially for the purpose might greatly

inhibit the development of interests and abilities which only some exposure to the traditional pattern of graduate study can accomplish. Perhaps Professor Siegel exaggerates the time and attention the student would have to give to the "professional" aspects of his training. It is generally thought that undergraduate normal schools have over-emphasized purely technical training at the expense of that cultivation of intellect which is the hallmark of the great teacher. It is all too probable that the same development would occur in specialized graduate schools for the preparation of teachers. If, on the other hand, these schools remained faithful to the Muses while accepting their social responsibilities, would they differ essentially from the graduate school as presently constituted, expanded and adjusted to meet the new needs which confront us? If this question is answered negatively, then the development of separate schools might be wasteful and unnecessary, provided our current graduate schools could be altered to cope with the future.

The teachers of the future must be the best teachers ever trained in America. Truly, the challenge is the greatest ever presented to American education. We teachers must be ready; we must receive more and better training than ever before. It must not be watered down under any circumstances. The schools designed to prepare our teachers must be, more than ever, the repository of scholarship, but they must be especially aware that in their hands rest the hopes and aspirations of millions. Professional technique must not be neglected, but scholarship must be encouraged as never before.

One other opinion voiced by Professor Siegel requires some consideration. He suggests that many Doctoral Theses in the Humanities and the Social Sciences have become "trivial," that they have deteriorated because graduate schools designed to train students in these disciplines have been tacitly alienated "...from the goal of free inquiry to that of the training of college teachers...." He notes, in this connection, that students who receive Ph.D.'s in these fields tend to turn to teaching in much larger numbers than those who receive degrees in the Natural Sciences. Undoubtedly, one of the major reasons for this trend is that industry offers an outlet to recipients of degrees in the Natural Sciences, whereas no such vast outlet exists for students of the Humanities or the Social Sciences. Professor Siegel holds that in his discipline, the field of physics, "trivial" theses never get by, unless the institution is sub-standard. To pass such cavalier judgment on the qualities of theses in other fields without definition and documentation is certainly a dubious procedure. What are the standards for judging "triviality" adopted by Professor Siegel? These must be known, if we are to consider his allegation intelligently.

Physicists are not generally prone to criticize theses on grounds of "triviality." In fact, physicists are often prone to insist on the need to pursue scholarship for its own sake. It is from such research, they argue, that great new advances sometimes develop. Professor Siegel subscribes somewhat elliptically to the same view in his article. Most would agree with this view. Theses ought to be called "trivial" only if they do not sharpen the student's awareness of complexity, improve his critical judgment and performance, and stimulate higher contemplation, among other values. It is not the subject, so much as the intellectual experience and practice connected with it, that lends distinction to a thesis topic. Undoubtedly, the subject of a thesis contributes to its utility as an educa-

tional medium, but a searching study is necessary before a subject can be called "trivial" in the sense that Professor Siegel appears to use the word.

To summarize, it is here contended that graduate schools ought to plan to train a much larger number of teachers; that graduate schools can retain their basic identity and function despite enlargement; that teachers generally require exposure to the life of contemplation and scholarship during and after their preparation; that scholarship and teaching are usually complementary. These comments are offered as alternatives to the views expressed by Professor Armand Siegel in the GRADUATE JOURNAL, in a previous number.

Boston University Films

[*Continued from p. 102*]

This film shows the method of transplantation of neoplastic tissue into the cheek pouch of the hamster and the appearance of tumors of different animal origin as they undergo active proliferation in this site.

The utilization of the membranous cheek pouch of the hamster for the transplantation of neoplastic tissue is shown. The method of everting the cheek pouch and making the transplant is shown. Tumors at various stages in their growth are seen under different magnifications and lighting conditions to demonstrate the vascularization of this site in relation to the transplant. The growth rate of a hamster tumor in the first passage is compared with that of second and third passages by means of an animated graph. Examples of successful heterologous transplantation are shown. Thromboembolism in advanced neoplasia is illustrated in the opposite pouch.

Purchase price is $95.00.

"White Thromboembolism in the Minute Cheek Pouch Vessels of the Hamster"

BRENTON R. LUTZ, GEORGE P. FULTON and ROBERT P. AKERS

One reel (400 feet) 16 mm. silent Kodachrome film with titles. Running time, 15 minutes at 16 frames per second. Certified by the American College of Surgeons.

This film shows the formation of platelet and leukocytic thromboembolism induced by trauma, infection, and transplanted neoplasia in the transillumined cheek pouch of the hamster at magnifications of 100 to 1200 X. The fragmentation of thrombi to form emboli is photographed. Platelet coatings and mural thrombi as well as platelet emboli are shown in hamsters with generalized infection with *Staphylococcus aureus*. Immobilized leukocytes appear as pavements on the endothelium of venules in tumor bearing hamsters and in hamsters 24 hours after Tromexan. A new method for determining vascular fragility is demonstrated by stimulating the endothelium with a microelectrode and determining the threshold for bleeding. A hemostatic platelet plug forms in the heparinized hamster. A red thrombus is shown in the lee of a platelet thrombus.

The purchase price is $95.00.

Boston University Book Reviewed

Races and People, by William C. Boyd* and Isaac Asimov.** New York: Abelard & Schuman, Inc., 1955, 189 pp., $2.50.

Reviewed by GEORGE R. HORNER***

This book is a result of collaboration between William C. Boyd and Isaac Asimov. Dr. Boyd's research in the field of Immunochemistry and Genetics has brought him world-wide recognition. Dr. Asimov is well-known as a biochemist. He has written authoritatively on this subject as well as science-fiction works for adults and teen-agers.

Races and People attempts to make the subject of race attractive to young people. In fact, if it succeeds the book should not only prove helpful to teen-agers but to anyone who would like an introduction to the study of race. There is a need for such a book.

The authors recognize that the word "race" means different things to different people. Most of these meanings have little if any scientific value. Other meanings reflect attitudes and prejudices with imputed values of "racial inferiority" and "racial superiority" of one group to another because of birth, religion, language, nationality, or skin color. Such criteria, say the authors, not only do not define race..."unfortunately, most of them are quite wrong too" (p. 25).

Since biological differences are inherited, perhaps a definition of race may be made according to physical similarities and differences in human types, based upon the research of the physical anthropologist. Accordingly, such physical traits as skin, hair, eyes, bones, and head shapes are considered in this light. We are now faced with another problem. All members of a "long-headed" race of people would not have the same skin color, "no single type of physical difference is sufficient" (p. 55). To define "race" one must look elsewhere. Perhaps there will be a clue in investigating blood groups.

"What we really need is some characteristic which is decided by a single gene series with known genes ..." (p. 126). The only physical characteristic which satisfies this prescription, according to the authors, is blood. With the use of excellent illustrations by John Bradford, the authors go into the necessary detail and care in presenting cell structure and function to teen-agers. They particularly emphasize the role of inheritance of physical characteristics to show that any meaningful idea of race is by blood-groups and inherited genes.

Blood, caution the authors, has no mystical qualities as is often popularly expressed when one speaks of "national blood," "French blood," or "Negro blood" for, "this is all nonsense and superstition" (p. 127). They continue, "There would be no way in the world (a scientist) could determine for sure whether it (blood) came from a man or a woman, a Frenchman or a German..." "Nor could your body, if the blood were put into your veins" (p. 127).

Blood can be classified according to its type. The type is controlled by the nature of inherited genes which make up a series. "Every person has two genes of that gene series, one on

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each of a pair of chromosomes. He inherits one gene from his father and one from his mother" (p. 134). In addition to the more familiar blood-group series of A, B, AB, and O there are others such as the M, N, and the Rh series. These series have a world-wide distribution.

The use of blood-groups in defining races has several advantages over other criteria; only a scientist, by examining blood, can classify a race, thus eliminating prejudice resulting from "merely looking at a man." Unlike other physical characteristics blood-groups are inherited in known ways. A blood type is determined at conception and is not influenced by environment (pp. 145-146). Blood can tell us something about man's migrations, history, interbreeding, evolution, and racial groupings.

Classified by blood-groups and gene frequencies, there are at least six races:

1. *Australian* (Aboriginal): low B or none, low M no A_2

2. *American* (Indian): low B or none, low N, no A_2

3. *Asian:* High B, high Rh°, some rh, high A_2. (Small *r* is a recessive character.)

4. *African:* High B, high Rh°, some rh, high A_2.

5. *European:* moderately high rh, moderate B, moderate A_2.

6. *Early European:* very high rh, no B. (Modern Basques)

(The genes for O and A are so widespread among all groups of people that they are useless in racial classification.)

An accompanying map shows a seventh racial group — Indo-Dravidian — which is "less clear-cut," plus areas in northern Africa, western Asia, and the East Indies where blood-group studies are yet to be made in detail.

Races and People is convincingly written despite the necessity on the part of its authors to bring the material "down" to a teen-age level with some resultant over-simplification. The authors have made the subject of race interesting and attractive to young people. In this sense they have been successful in their goal.

Except for the data on the frequency of gene types by geographical distribution (p. 158), the book says little which hasn't been said already by anthropologists and sociologists.

One has reason to hope that this small volume, in presenting the problems and answers to "race" clearly to younger students, will overcome prejudices already acquired.

Announcement

On Wednesday, March 20, 1957, the second presentation over CBS-TV of the Bell Telephone System TV science series will be made. This program is titled "Hemo the Magnificent" and is concerned with the circulation of the blood. The program is produced and directed by the Academy Award-winning director Frank Capra.

Some of the scenes in this film were prepared in the Boston University Biological Laboratories by Dr. George P. Fulton and Dr. Brenton R. Lutz in cooperation with Dr. Kenneth Arendt, Research Associate, and Mr. Frederick Maynard, Staff Photographer. Dr. Fulton was one of the advisors to the Capra studios.

Nonparametric Statistics

GOTTFRIED E. NOETHER*

In an earlier article[1] in the *Graduate Journal*, this writer pointed out briefly that when analyzing research data, it may often be more appropriate to use nonparametric, rather than the more customary parametric, methods. The purpose of this note is to give a short bibliography of papers and books containing practical information about nonparametric methods and to point out certain facts about these methods which are not too well known.

Nonparametric theory has experienced a very rapid development in recent years. However, until recently most textbooks on statistics either ignored nonparametric methods altogether or brushed them off with the remark that they were inefficient and wasteful of information. It is, therefore, not surprising if the general research worker for whom statistical procedures simply constitute a tool for drawing valid conclusions from his observations, is not too familiar with many of these very useful new techniques. Fortunately, during the last few years, a considerable amount of summary information about nonparametric methods has become available.

At this time, only one[2] book-length treatment of the subject has appeared in print: S. Siegel, *Nonparametric Statistics for the Behavioral Sciences*, New York: McGraw-Hill, 1956. This book is particularly useful because it brings together in one place many of the tables required for nonparametric methods.

The following textbooks contain chapters dealing with nonparametric methods:

Dixon, W. J. & F. J. Massey, Jr., *Introduction to Statistical Analysis*, New York: McGraw-Hill, 1956 (Chapter 17).

Walker, H. M. & J. Lev, *Statistical Inference*, New York: Holt, 1953 (Chapter 18, written by L. E. Moses).

Wallis, W. A. & H. V. Roberts, *Statistics: A New Approach*, Glencoe, Illinois: Free Press, 1956 (Chapters 18 and 19).

Useful information can also be found in the following articles:

Bradley, R. A., "Some Notes on the Theory and Application of Rank Order Statistics," *Industrial Quality Control*, Vol. II, Nos. 5 & 6, 1955.

Moses, L. E., "Nonparametric Statistics for Psychological Research," *Psychology Bulletin*, Vol. 49, 1952, pages 122-143.

Savage, I. R., "Bibliography of Nonparametric Statistics and Related Topics," *Journal of American Statistical Association*, Vol. 48, 1953, pages 844-906.

Wallis, W. A., "Rough-and-Ready Statistical Tests," *Industrial Quality Control*, Vol. 8, No. 5, 1952.

The remark mentioned earlier, that nonparametric methods are inefficient, deserves comment. However, it is first necessary to place nonparametric methods in their proper perspective.

Strictly speaking, parametric methods give valid results only if all the assumptions concerning the form of the underlying population distribution are satisfied. In practice, this will rarely if ever be the case. While in general, slight deviations from the assumed population distribution do not invalidate conclusions based on parametric methods of analysis, if nothing is known about the kind of deviations to be expected, it is often safer to employ methods of analysis which give valid results, whatever

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the underlying distributions. Most nonparametric methods are valid as soon as it is reasonable to assume that we are sampling from some arbitrary continuous population. And even this slight restriction on the form of the underlying distribution can often be avoided through the introduction of suitable modifications in the test procedure.

The concept of efficiency is well known as far as the comparison of two estimates of the same parameter is concerned. Thus, the relative efficiency of one [unbiased] estimate with respect to another [unbiased] estimate is given by the inverse ratio of the variances of the two estimates. Let this ratio be denoted by e. The smaller e, the larger the variance of the first estimate as compared to the variance of the second estimate, and, as a consequence, the more inaccurate the first estimate as compared to the second estimate. This statement can be made more precise. By taking more observations, any estimate can be made as accurate as any other estimate. The quantity $1/e$ tells us how many more observations we need to take in order to make the less efficient estimate [the one with the larger variance] as accurate as the more efficient estimate. Or putting it differently, if we had used the more efficient estimate, we could have saved ourselves the trouble of taking the last $100e$ per cent of the observations without reducing the accuracy of our result.

When testing hypotheses, the concept of relative efficiency becomes somewhat more complicated since we must also consider the power of the two tests. However, the interpretation of the resulting quantity e remains the same. The more efficient test based only on $100e$ per cent of the observations is just as powerful as the less efficient test based on all observations.

As an example, it is usually stated that the asymptotic relative efficiency of the sign-test as compared to the t-test is .64. According to what we have just said, this would imply that, if we analyze a given set of observations according to the rules of the sign-test instead of according to the rules of the t-test, we are "wasting" more than one-third of all observations. The point usually overlooked when making this kind of a statement is that it applies only if all the conditions for the correct application of the t-test are satisfied, i.e., if we actually have a random sample from a normally distributed population. But how often are we really certain that these conditions are satisfied? They may, or they may not be. Most of the time, there is no way of knowing what the true situation is. In such a case, the statement that the relative efficiency of the sign-test is .64 has absolutely no meaning. It may be greater, though not necessarily. The important point is that by using a nonparametric test we can be sure of performing a test at the stated significance level whatever the true population distribution, a statement which cannot be made about the t-test.

Of course, if from past experience we can be fairly certain that the conditions for the correct application of the t-test are satisfied, it would be wasteful of information to use the sign-test, unless the statistician felt that the greater simplicity of the nonparametric procedure outweighed the loss of information.

What has just been said about the sign- and t-tests applies equally well for all other nonparametric tests and their parametric counterparts. Actually, many nonparametric tests have relative efficiencies of the order .91 [rank correlation test], .95 [Wilcoxon one- and two-sample tests] and even higher. Thus very little is lost by using these tests under conditions when it would be legitimate to employ the

corresponding parametric methods. On the other hand, a great deal may be gained by using them when conditions are such that it would be incorrect to employ parametric procedures. Often suitable modifications of the nonparametric tests are available which raise their relative efficiency to 1. In the case of the sign-test it is even possible to save on the average 20 or 30 per cent of the observations required for the t-test by carrying out the sign-test sequentially.

It is true that as of now nonparametric equivalents do not exist for all parametric procedures in current use. This is particularly true of problems requiring regression methods and/or confidence statements for their solution. However, many more nonparametric methods are available than is generally realized.

One final remark to bring out an additional advantage of nonparametric methods, often overlooked: the usual parametric methods require that we perform arithmetic operations like addition and multiplication on the observations. These operations are legitimate only if measurements are on the level of at least an interval scale. However, in practice, particularly as far as the social scientist is concerned, measurements are often only on the level of an ordinal scale. Since most nonparametric procedures depend only on the rankings of the observations, ordinal scale measurements are sufficient. On the other hand, they are not sufficient for the application of the usual parametric methods, though, of course, in practice this point is rarely taken into consideration.

References

[1]Noether, Gottfried, E., "Statistics and Scientific Research," Boston University *Graduate Journal*, Vol. 4, No. 5, 1956, pages 84-87.

[2]The book by D. A. S. Fraser, *Nonparametric Methods in Statistics*, New York: Wiley, 1957, is of a purely theoretical nature in spite of its name.

University Lecture — April 9, 1957

Professor Donald DeWitt Durrell, School of Education, will give the second University Lecture of the academic year 1956-57 on Tuesday, April 9, 1957, in Hayden Hall, 685 Commonwealth Avenue, Boston, at 8:15 P.M.

The subject of Professor Durrell's lecture is announced as "The Search for Better Schools."

The University Lectures are open to all associated with the University and to those of the general public who are interested. No tickets of admission are necessary.

Tower Collection in the Chenery Library

One of the most interesting acquisitions this Library has received is a collection of bound scrapbooks from the Tower family. The Collection was assembled by Burgess Clifford Tower and was given to the Library by his sons, one of whom, Leighton S., was a graduate of the College of Liberal Arts in 1928.

Each volume, or group of volumes, within the Collection is devoted to a single author or topic. The contents range from contemporary newspaper clippings, reviews, and photographs to whole monographs bound in or mounted on sheets. They are arranged, for the most part, chronologically. Some of the authors who are represented in this collection are Browning, Carlyle (2 v.), Dickens (9 v.), Emerson (3 v.), Henry James (4 v.), Poe (2 v.), and Twain (3 v.).

No general library could justify the cost of subject analysis for this collection. To do even the four volumes of Hawthorne, described below, would require over three hundred cards for complete subject and author representation of each item, and at least one hundred entries if selective analysis were made.

However, the value of this material is more for the graduate student searching for small bits of information on an author, than for the undergraduate, so the lack of subject analysis is not serious if we can establish some general knowledge of the Collection. In this brief account the Library hopes to bring to the attention of the Faculty and graduate students the existence of this body of material. The collection is yet "unmined," virtually unexplored, and it offers interesting bibliographical problems as well as valuable information on numerous figures of English and American literature.

As a measure of evaluation of the contents of this Collection, the four volumes on Hawthorne were analyzed. There are approximately three hundred items, the earliest being a comment on Hawthorne by Henry Chorley, clipped from the *Athenaeum* of November 7, 1835. The centenary number of the *Critic*, for July, 1904, is included complete. There are contemporary reviews by Lowell, Howells, Holmes, Trollope, and others. There are at least fourteen Hawthorne items from periodicals representing the first appearance in print of these titles. Among these are the "Four Tales of the Province House" from the *Democratic Review*, 1838-39; "Fire-worship," in the same journal for December, 1843; and "Septimus Felton" from the *Atlantic*, January-August, 1872. Several of the other volumes promise equally interesting coverage of an author.

M. D. Herrick